

Course Code	TKIE162201		
Course Name	Electromagnetic Field (Course+Tutorial)		
Course Instructors	Eny Sukani Rahayu; Iswandi.		
Course Type	Required		
Course Classification	Engineering Topics		
Credit / Contact Hour per Week	3 / 150 minutes per Week		
Course Description	Understand the basic concepts of Electromagnetic Fields include: Concept of Field and Vector Calculus, Coordinate System, Electrical Field Theory, Electric Current, Magnetic Field Theory, Electrical and Magnetic Material, Hysteresis, Electromagnetic Boundary Condition, Electromagnetic Induction, Inductance, Capacitance, Resistance, Ampere's Law, Faraday's Law, Gauss' Law, Ohm, Joule's Law, Magnetic Circuit, Transmission Line, Maxwell's Equation, Electromagnetic Waves		
Prerequisites Courses	-		
Covered Student Outcome	Fundamental Engineering Knowledge (a) Development of Engineering Solution (b)		
Learning Outcome			
		Study Program	Student Outcome
No	Learning Outcome	SO (a) – SO (k)	
1.	Students are able to calculate and find appropriate solutions of fundamental electromagnetic field	Development of Engineering Solution (b)	
2.	Students are able to formulate and use the Maxwell Equations to model the behavior of the electromagnetic field in a line, field, or volume and can analyze the behavior of the field	Development of Engineering Solution (b)	
3.	Students are able to solve magnetic strand-related cases, electronic induction and its application.	Development of Engineering Solution (b)	
4.	Students are able to formulate the Maxwell equation for uniform plane wave and transmission line	Fundamental Engineering Knowledge (a)	
Topic	<ol style="list-style-type: none"> 1. Concept of Field 2. Calculus vector: multiplication and addition of vector, del / nabla, curl, grad, div, laplacian, line integral, surface integral, and integral volume 3. Coordinate system (s.k) and its transformation: square c.s., cylinder c.s., and ball c.s. 4. Electric field theory: electric field source (charge and charge distributed), electric field strength, electric flux, electric flux density, electric force / Coulomb force, electric potential, energy stored in an electric field 5. Magnetic field theory: magnetic field source, magnetic field strength, magnetic flux, magnetic flux density, Biot-Savart's law, Lorentz force, Ampere force, energy stored in magnetic field 6. Magnetic Circuit and electromagnetic Induction 7. Maxwell's Equations : 8. Transmission Line 9. Uniform plane wave. 		
Direct Assesment	Direct Assesment Plan	Measured Learning Outcome	
	Mid Exam	LO1, LO2	
	Final Exam	LO3, LO4	
	Homeworks	LO3, LO4	
	Class assignments	LO3, LO4	
Indirect Assesment	Questionnaire and direct communication		

References	<ul style="list-style-type: none"> a. W.H.Hayt dan J.A. Buck, Engineering Electromagnetic 8ed , Mc Graw Hill, 2010 b. Maxwell Equations, J. A. Kong, EMW Publishing, 398 pg, 2002 c. Veselago, V., 1968, The electrodynamics of substance with simultaneously negative values of ϵ and μ, Soviet Phys. Uspekhi, 10:509-514 d. Li, Ji Chun, dan Huang, Yun Qing, 2013, Time Domain Finite Element Method for Maxwell's Equations in Metamaterials, Springer Series in Computational Mathematics e. Katsarakis, N., dkk, 2004, Electric coupling to the magnetic resonance of split ring resonators, Applied Physics Letters, Vol. 84., No.15
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